

<p><b>Claim 1:</b> Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.</p>	
<p>Content Domain: <b>Operations and Algebraic Thinking</b></p>	
<p><b>Target B [a]:</b> Analyze patterns and relationships. (DOK 2)</p> <p>Tasks for this target will ask students to compare two related numerical patterns and explain the relationships within sequences of ordered pairs. Tasks for this target may incorporate the work of 5.G Target J.</p>	
<p>Standards:</p> <p>5.OA.B, 5.OA.B.3</p>	<p><b>5.OA.B Analyze patterns and relationships.</b></p> <p><b>5.OA.B.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. <i>For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</i></p>
<p>Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling:</p> <p>4.OA.C, 4.OA.C.5</p> <p>6.NS.C, 6.NS.C.8</p>	<p><b>Grade 4 Standards</b></p> <p><b>4.OA.C Generate and analyze patterns.</b></p> <p><b>4.OA.C.5</b> Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. <i>For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.</i></p> <p><b>Grade 6 Standards</b></p> <p><b>6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.</b></p> <p><b>6.NS.C.8</b> Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.</p>
<p>DOK Level(s):</p>	<p>2</p>

<b>Achievement LEVEL Descriptors:</b>	
<b>RANGE Achievement Level Descriptor (Range ALD)</b> Target B: Analyze patterns and relationships.	<b>Level 1</b> Students should be able to generate two numerical patterns using two given rules involving addition, subtraction, or multiplication.
	<b>Level 2</b> Students should be able to generate two numerical patterns using two given rules involving all operations. When working with two whole number numerical patterns, they should be able to graph the corresponding whole number ordered pairs on the coordinate plane.
	<b>Level 3</b> Students should be able to compare and analyze two related numerical patterns and explain the relationship within sequences of ordered pairs, and they should be able to graph the ordered pairs on the coordinate plane.
	<b>Level 4</b> Students should be able to compare two related numerical patterns and explain the relationship within sequences of ordered pairs that are rational numbers.
Evidence Required:	1. Given two rules, the student identifies and explains apparent relationships between corresponding terms of two related numerical patterns.  2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane.
Allowable Response Types:	Multiple Choice, single correct response; Graphing; Hot Spot
Allowable Stimulus Materials:	coordinate plane model in quadrant I only
Construct-Relevant Vocabulary:	coordinates, ordered pairs, pattern, sequence
Allowable Tools:	None
Target-Specific Attributes:	Use only whole numbers. Patterns have one-step rules using addition, subtraction, multiplication, or division of whole numbers; and addition, subtraction, or multiplication of fractions. Patterns should be limited to 4–6 terms. Emphasize the use of patterns where there is an apparent relationship between corresponding terms appropriate for students in grade 5 to build toward the grade 6 work in the RP domain.
Non-Targeted Constructs:	None
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines <sup>1</sup> when developing items.  Language Key Considerations: <ul style="list-style-type: none"> <li>• Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context</li> <li>• Avoid sentences with multiple clauses</li> <li>• Use vocabulary that is at or below grade level</li> </ul>

<sup>1</sup> For more information, refer to the General Accessibility Guidelines at:

<http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf>

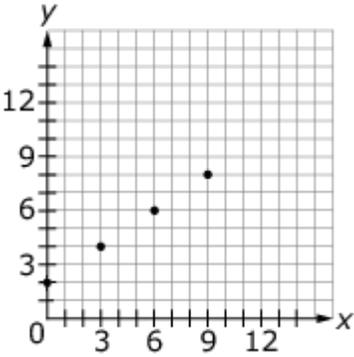
	<ul style="list-style-type: none"> <li>• Avoid ambiguous or obscure words, idioms, jargon, unusual names and references</li> </ul> <p>Visual Elements/Design Key Considerations:</p> <ul style="list-style-type: none"> <li>• Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context</li> <li>• Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary</li> <li>• Avoid crowding of details and graphics</li> </ul> <p>Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.<sup>2</sup></p>
Development Notes:	The part of the standard that requires explaining informally how corresponding terms from two numerical patterns are related will be assessed in Claim 3.

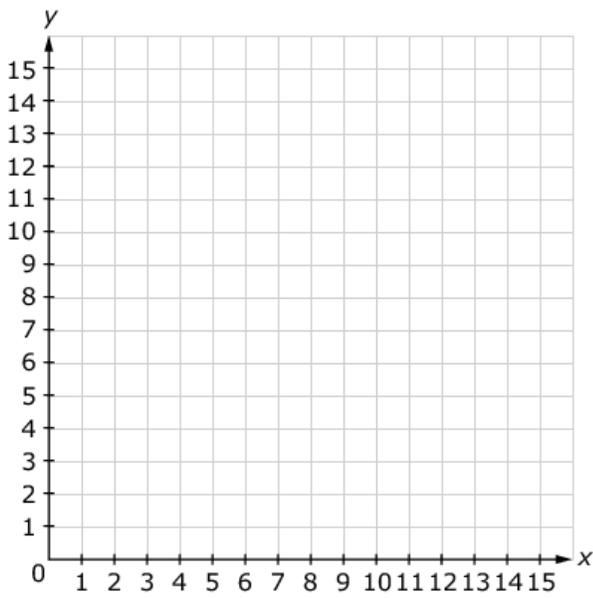
<sup>2</sup> For more information about student accessibility resources and policies, refer to [http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced\\_Guidelines.pdf](http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf)

<p><b>Task Model 1</b></p> <p><b>Response Type:</b> <b>Multiple Choice, single correct response</b></p> <p><b>DOK Level 2</b></p> <p><b>5.OA.B.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. <i>For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</i></p> <p><b>Evidence Required:</b> 1. Given two rules, the student identifies and explains apparent relationships between corresponding terms of two related numerical patterns.</p> <p><b>Tools:</b> None</p>	<p><b>Prompt Features:</b> The student is prompted to identify apparent relationships between corresponding terms of two related numerical patterns.</p> <p><b>Stimulus Guidelines:</b></p> <ul style="list-style-type: none"> <li>• Item difficulty can be adjusted via these example methods:       <ul style="list-style-type: none"> <li>○ One-step rule using addition, subtraction, multiplication, or division (up to 4-digit by 1-digit) of whole numbers</li> <li>○ One-step rule using addition and subtraction of fractions with common denominators, or multiplication by unit fractions</li> <li>○ One-step rule using addition, subtraction, and multiplication of fractions with non-common denominators</li> </ul> </li> </ul> <p><b>TM1</b> <b>Stimulus:</b> The student is presented with the starting number and rule for two related numerical patterns.</p> <p><b>Example Stem:</b> Patterns A and B are generated using these rules.</p> <ul style="list-style-type: none"> <li>• Pattern A: Start with 10 and add 5.</li> <li>• Pattern B: Start with 2 and add 1.</li> </ul> <p>Which statement <b>best</b> describes the relationship between the corresponding terms of Pattern A and Pattern B?</p> <ul style="list-style-type: none"> <li>A. Each term in Pattern A is <math>\frac{1}{5}</math> of the value of the corresponding term in Pattern B.</li> <li>B. Each term in Pattern A is 4 more than the value of the corresponding term in Pattern B.</li> <li>C. Each term in Pattern A is 5 times the value of the corresponding term in Pattern B.</li> <li>D. Each term in Pattern A is 8 more than the value of the corresponding term in Pattern B.</li> </ul> <p><b>Rubric:</b> (1 point) The student selects the correct description of the relationship (e.g., C).</p> <p><b>Response Type:</b> Multiple Choice, single correct response</p>
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<p><b>Task Model 2a</b></p> <p><b>Response Type:</b> <b>Multiple Choice, single correct response</b></p> <p><b>DOK Level 2</b></p> <p><b>5.OA.B.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. <i>For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</i></p> <p><b>Evidence Required:</b> 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane.</p> <p><b>Tools:</b> None</p>	<p><b>Prompt Features:</b> The student is prompted to identify an ordered pair or set of ordered pairs that correspond to a given stimulus.</p> <p><b>Stimulus Guidelines:</b></p> <ul style="list-style-type: none"> <li>• Item difficulty can be adjusted via these example methods:       <ul style="list-style-type: none"> <li>○ One-step rule using addition, subtraction, multiplication, or division (up to 4-digit by 1-digit) of whole numbers</li> <li>○ One-step rule using addition and subtraction of fractions with common denominators, or multiplication by unit fractions</li> <li>○ One-step rule using addition, subtraction, and multiplication of fractions with non-common denominators</li> </ul> </li> </ul> <p><b>TM2a</b> <b>Stimulus:</b> The student is presented with the starting number and rule for two related numerical patterns.</p> <p><b>Example Stem:</b> Patterns P and Q are generated using these rules.</p> <ul style="list-style-type: none"> <li>• Pattern P: Start with 0 and add 1.</li> <li>• Pattern Q: Start with 0 and add <math>\frac{1}{4}</math>.</li> </ul> <p>Which set of ordered pairs is generated from corresponding terms of Pattern P and Pattern Q?</p> <p>A. <math>(0, 0), (1, \frac{1}{4}), (2, \frac{1}{2}), (3, \frac{3}{4})</math></p> <p>B. <math>(1, \frac{1}{4}), (1, \frac{1}{2}), (1, \frac{3}{4}), (1, 1)</math></p> <p>C. <math>(0, 0), (1, 2), (2, 3), (3, 4)</math></p> <p>D. <math>(\frac{1}{4}, \frac{1}{2}), (\frac{1}{2}, \frac{3}{4}), (\frac{3}{4}, 1), (1, \frac{1}{4}), (1, \frac{1}{2})</math></p> <p><b>Rubric:</b> (1 point) The student selects the correct set of ordered pairs (e.g., A).</p> <p><b>Response Type:</b> Multiple Choice, single correct response</p>
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<p><b>Task Model 2b</b></p> <p><b>Response Type:</b> <b>Hot Spot</b></p> <p><b>DOK Level 2</b></p> <p><b>5.OA.B.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. <i>For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</i></p> <p><b>Evidence Required:</b> 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane.</p> <p><b>Tools:</b> None</p> <p><b>Version 3 update:</b> Removed redundant prompt and guidelines from TM2b.</p> <p><b>Accessibility Note:</b> Hot Spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.</p>	<p><b>TM2b</b></p> <p><b>Stimulus:</b> The student is presented with the starting number and rule for two related numerical patterns.</p> <p><b>Example Stem:</b> Patterns P and Q are generated using these rules.</p> <ul style="list-style-type: none"> <li>• Pattern P: Start with 2 and add 3.</li> <li>• Pattern Q: Start with 2 and add 2.</li> </ul> <p>The first two ordered pairs generated by these rules are (2, 2) and (5, 4). Enter the fifth ordered pair generated from corresponding terms of Pattern P and Pattern Q.</p> <p>(     ,     )</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">0</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">1</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">2</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">2</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">2</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">2</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">3</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">3</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">3</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">3</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">4</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">4</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">4</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">4</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">5</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">5</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">5</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">5</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">6</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">6</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">6</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">6</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">7</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">7</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">7</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">7</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">8</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">8</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">8</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">8</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">9</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">9</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">9</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">9</td> </tr> </table> <p><b>Rubric:</b> (1 point) The student correctly enters the ordered pair for the corresponding fifth terms in the given patterns [e.g., (14, 10)].</p> <p><b>Response Type:</b> Hot Spot</p>	0	0	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9
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<p><b>Task Model 2c</b></p> <p><b>Response Type:</b> <b>Multiple Choice, single correct response</b></p> <p><b>DOK Level 2</b></p> <p><b>5.OA.B.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. <i>For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</i></p> <p><b>Evidence Required:</b> 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane.</p> <p><b>Tools:</b> None</p>	<p><b>Prompt Features:</b> The student is prompted to identify the graph that represents a set of ordered pairs generated by two patterns.</p> <p><b>Stimulus Guidelines:</b></p> <ul style="list-style-type: none"> <li>• Answer choices will be graphs showing four points in the first quadrant.</li> <li>• Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> <li>○ One-step rule using addition, subtraction, multiplication, or division (up to 4-digit by 1-digit) of whole numbers</li> <li>○ One-step rule using addition and subtraction of fractions with common denominators, or multiplication by unit fractions</li> <li>○ One-step rule using addition, subtraction, and multiplication of fractions with non-common denominators</li> </ul> </li> </ul> <p><b>TM2c</b> <b>Stimulus:</b> The student is presented with the starting number and rule for two related numerical patterns.</p> <p><b>Example Stem:</b> Patterns X and Y are generated using these rules.</p> <ul style="list-style-type: none"> <li>• Pattern X: Start with 0 and add 3.</li> <li>• Pattern Y: Start with 2 and add 2.</li> </ul> <p>Which graph shows a set of points representing ordered pairs formed by corresponding terms in these two patterns?</p> <p>[Note: Options are four different graphs]</p> <p><b>Rubric:</b> (1 point) The student selects the correct graph (e.g., shown below).</p> <div style="text-align: center;">  </div> <p><b>Response Type:</b> Multiple Choice, single correct response</p>
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<p><b>Task Model 2d</b></p> <p><b>Response Type:</b> <b>Graphing</b></p> <p><b>DOK Level 2</b></p> <p><b>5.OA.B.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. <i>For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</i></p> <p><b>Evidence Required:</b> 2. Given two rules, the student represents corresponding terms from two related numerical patterns as ordered pairs and plots them on a coordinate plane.</p> <p><b>Tools:</b> None</p> <p><b>Accessibility Note:</b> Graphing items are not currently able to be Brailled. Minimize the number of items developed to this TM.</p>	<p><b>Prompt Features:</b> The student is prompted to graph three or four ordered pairs on a coordinate plane.</p> <p><b>Stimulus Guidelines:</b></p> <ul style="list-style-type: none"> <li>All points will be in the first quadrant of the coordinate plane.</li> <li>Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> <li>One-step rule using addition, subtraction, multiplication, or division (up to 4-digit by 1-digit) of whole numbers</li> <li>One-step rule using addition and subtraction of fractions with common denominators, or multiplication by unit fractions</li> <li>One-step rule using addition, subtraction, and multiplication of fractions with non-common denominators</li> </ul> </li> </ul> <p><b>TM2d</b></p> <p><b>Stimulus:</b> The student is presented with the starting number and rule for two related numerical patterns.</p> <p><b>Example Stem:</b> Patterns X and Y are generated using these rules.</p> <ul style="list-style-type: none"> <li>Pattern X: Start with 5 and add 5.</li> <li>Pattern Y: Start with 1 and add 2.</li> </ul> <p>Graph three points to represent the ordered pairs formed by the first three corresponding terms in Pattern X and Pattern Y.</p>  <p><b>Rubric:</b> (1 point) The student correctly plots three points [e.g., (5, 1), (10, 3), (15, 5) OR (1, 5), (3, 10), (5, 15)].</p> <p><b>Response Type:</b> Graphing</p>
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